City of Mesa Food to Energy Program Overview

Lauren Whittaker, MPA, Special Projects Manager, *City of Mesa*

September 14, 2021

mesa·az

BACKGROUND

Business

Food Waste Collection

Center Street
Pre-Processing

NWWRP Product
Gas

RNG

Renewable Natural Gas

ENERGIZING MESA
FOR 100 YEARS
1917 - 2017

Natural Gas Utility

Fuel Collection Vehicles

FOOD TO ENERGY
For a Sustainable Community

mesa·az
BUILDING A SUSTAINABLE COMMUNITY
mesaaz.gov/sustainability

mesa·az

MESA KNOW YOUR H_2O

ENERGIZING MESA

FOR 100 YEARS

1917 - 2017

Benefits

- Typical GHG emissions waste process avoided (landfill, flare)
- Displacing fossil fuel use (heavy duty vehicle diesel use)
- Made from actual waste (as opposed to crops grown specifically for fuel)
- Local supply of natural gas
- Efficiencies in collection
- Extends life of landfill
- EPA Incentives through Renewable Fuel Standard (RIN Market)

FOOD TO ENERGY
For a Sustainable Community

mesa·az
BUILDING A SUSTAINABLE COMMUNITY
mesaaz.gov/sustainability

Feasibility Study

- Operational, Technical, and Financial
- Timeline: June 2018 - Jan 2020
- Internal: Engineering, Water Resources, Energy Resources, Environmental Management & Sustainability
- External: Arizona State University, City of Tempe, Arcadis

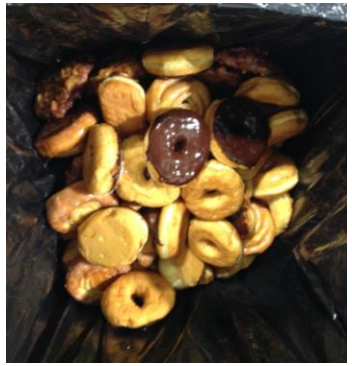
FOOD TO ENERGY
For a Sustainable Community

mesa·az
BUILDING A SUSTAINABLE COMMUNITY
mesaaz.gov/sustainability

Collection

Partners

- United Food Bank
- Mesa Public Schools
- Sheraton
- East Valley Institute of Technology Culinary School
- Bashas
- Arizona State University
- City of Tempe Grease Cooperative
- Arizona Recycling Coalition



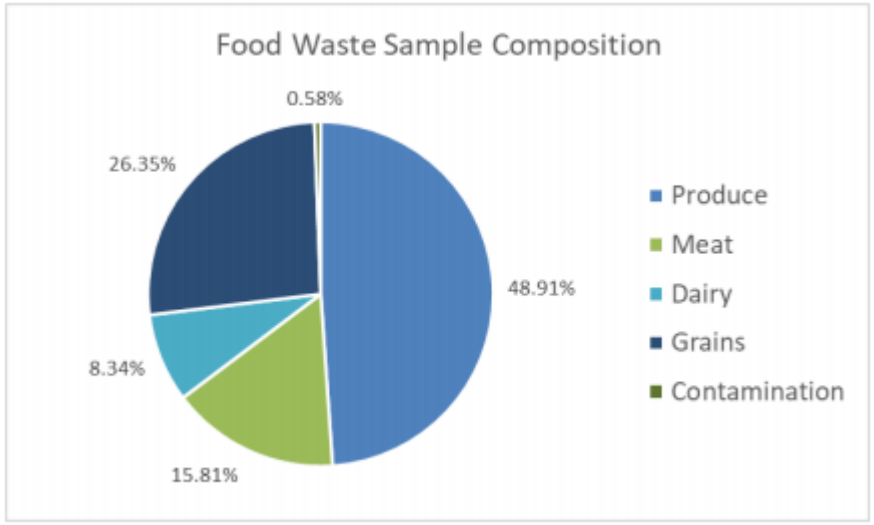
FOOD TO ENERGY
For a Sustainable Community

mesa·az
BUILDING A SUSTAINABLE COMMUNITY
mesaaz.gov/sustainability

Collection Results

- All Partners Enthusiastic
- Minimal Contamination

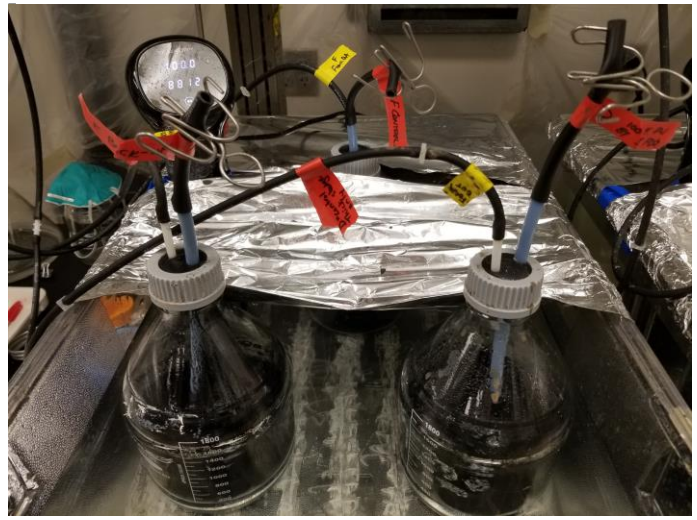
  (with pre-processing)
- Feedstock Analysis
- Developed food waste collection service model



FOOD TO ENERGY
For a Sustainable Community

mesa·az
BUILDING A SUSTAINABLE COMMUNITY
mesaaz.gov/sustainability

Processing & Benchscale Testing



FOOD TO ENERGY
For a Sustainable Community

mesa·az
BUILDING A SUSTAINABLE COMMUNITY
mesaaz.gov/sustainability

Processing & Benchscale Testing Results

- Established safe operating parameters
- Identified warning indicators
  - Composition can significantly alter conditions
  - Volatile Fatty Acids (VFA's) can accumulate, decreasing pH rapidly
- Increase in biogas production noted (up to 40%)
- Initial design for pre-processing facility

FOOD TO ENERGY
For a Sustainable Community

mesa·az
BUILDING A SUSTAINABLE COMMUNITY
mesaaz.gov/sustainability

Biogas Operations

- Determined gas system need – interconnection
- Developed RNG specifications with COM Energy Resources
- Developing RNG monitoring procedures

FOOD TO ENERGY
For a Sustainable Community

mesa·az
BUILDING A SUSTAINABLE COMMUNITY
mesaaz.gov/sustainability

Financial Evaluation

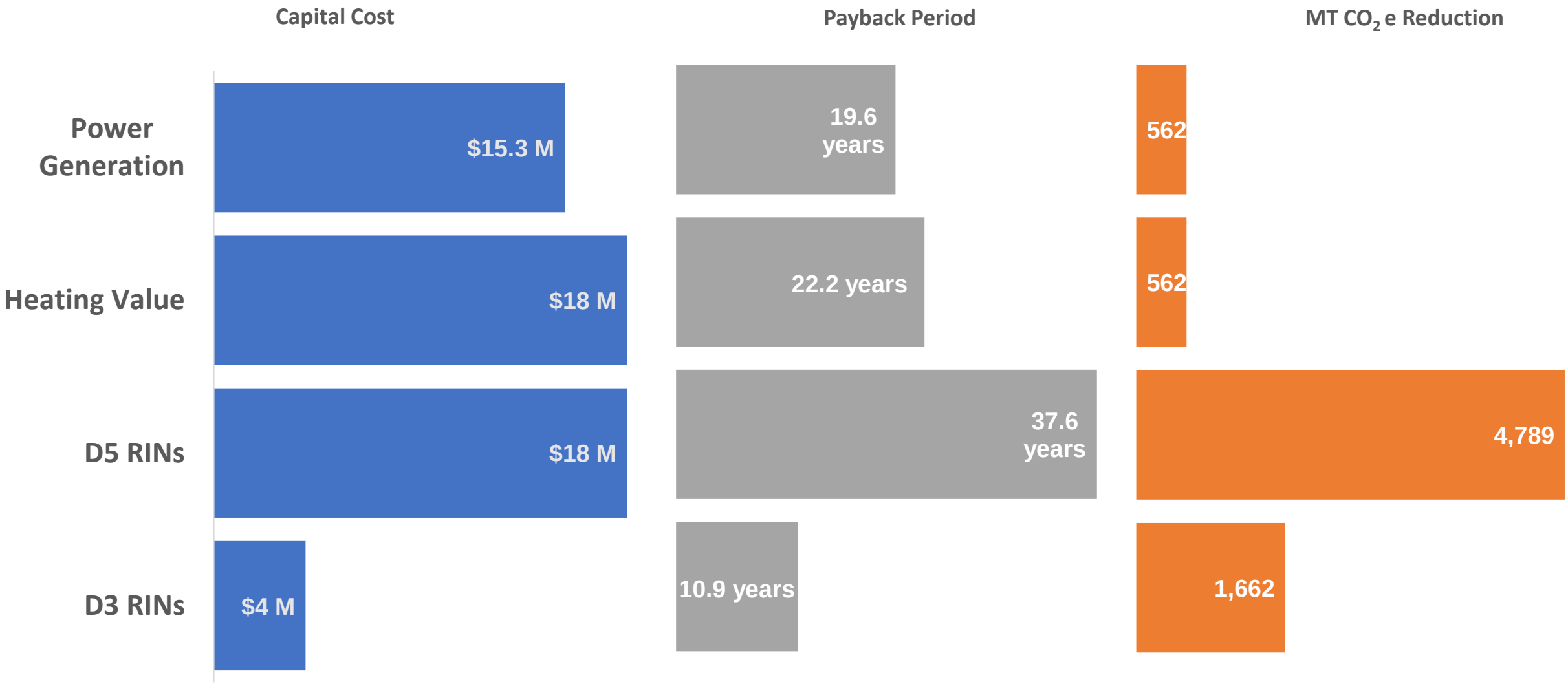
- Evaluated Incentives and Potential Biogas Uses
- Detailed Excel Project/Scenario Models Provided
- The economic evaluation included:
  - Capital improvement cost
  - Life-cycle costs
  - Potential savings or cost avoidance
  - Incremental costs
  - 20-year net present value
  - Payback period
  - Equivalent annual annuity
  - Sensitivity analysis

FOOD TO ENERGY
For a Sustainable Community

mesa·az
BUILDING A SUSTAINABLE COMMUNITY
mesaaz.gov/sustainability

Financial Results

**Presented January 2020 to Council*



Problem

- Biogas from Food Waste/FOG receives lower value incentives
- Biogas from WWTP/Landfill receives higher value incentives
- City of Mesa and ASU are working with EPA, DOE, and NREL to help find a solution to this issue.

FOOD TO ENERGY
For a Sustainable Community

mesa·az
BUILDING A SUSTAINABLE COMMUNITY
mesaaz.gov/sustainability

Moving Forward

Phase 1 – Flare to Fuel

- Upgrade biogas to generate D3 RINs
- Inject RNG into natural gas system
- Supply 50% of solid waste fleet annual natural gas consumption
- Currently in design
- Projected completed in Summer 2023

FOOD TO ENERGY
For a Sustainable Community

mesa·az
BUILDING A SUSTAINABLE COMMUNITY
mesaaz.gov/sustainability

Moving Forward

- Future Phases
  - Pre-Processing Facility
  - Food Waste Introduction Upgrade at WWTP
  - Evaluate other WWTPs

FOOD TO ENERGY
For a Sustainable Community

mesa·az
BUILDING A SUSTAINABLE COMMUNITY
mesaaz.gov/sustainability

Moving Forward

- New Administration/Incentives

- Partners/funding to address RIN Market D3/D5 split
  - Working with partners including DOE, EPA, NREL, and ASU
  - Develop a methodology for quantifying cellulose conversion to methane in complex waste streams (cellulosic vs non-cellulosic sources)

FOOD TO ENERGY
For a Sustainable Community

mesa·az
BUILDING A SUSTAINABLE COMMUNITY
mesaaz.gov/sustainability

Questions?

FOOD TO ENERGY
For a Sustainable Community

mesa·az
BUILDING A SUSTAINABLE COMMUNITY
mesaaz.gov/sustainability